

# Revision of the genus *Xyalaspis* Hartig, 1843 (Hymenoptera: Figitidae: Anacharitinae) in the Western Palaearctic

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## ABSTRACT

A revision of *Xyalaspis* Hartig, 1843 (Hymenoptera: Anacharitinae) in the Western Palaearctic region is given. *Xyalaspis spinigera* Reinhard, 1860 and *Xyalaspis subulifera* (Thomson, 1862) are synonymized with *Xyalaspis laevigata* Hartig, 1843 and *Xyalaspis rugosa* Hartig, 1843 respectively, and their distribution areas are extended. A new species *Xyalaspis pseudolaevigata* n. sp. is described from France. One species previously assigned to the genus *Xyalaspis*, *X. laevis* (Hedicke, 1914), is transferred to *Aegilips* Haliday, 1835. Diagnostic characters are illustrated and data about biology, distribution and morphological variability of the studied species are presented and discussed. A key to differentiate the Western Palaearctic species of *Xyalaspis* is included.

## KEY WORDS

Western Palaearctic,  
revision,  
new synonym,  
new combination,  
new species.

## RÉSUMÉ

Révision du genre *Xyalaspis* Hartig, 1843 (Hymenoptera: Figitidae: Anacharitinae) dans le Paléarctique occidental.

Le genre *Xyalaspis* Hartig, 1843 (Hymenoptera: Anacharitinae) est révisé pour le Paléarctique occidental. *Xyalaspis spinigera* Reinhard, 1860 et *Xyalaspis subulifera* (Thomson, 1862) sont mis en synonymie avec *Xyalaspis laevigata* Hartig, 1843 et *Xyalaspis rugosa* Hartig, 1843 respectivement, et l'aire de distribution de ces espèces est étendue. Une nouvelle espèce est décrite pour la France : *Xyalaspis pseudolaevigata* n. sp. *Xyalaspis laevis* (Hedicke, 1914), est transféré au genre *Aegilips* Haliday, 1835. Les caractéristiques diagnostiques plus importantes sont illustrées. Des données sur la biologie, la distribution et la variabilité morphologique des espèces sont discutées. Une clé pour différencier les espèces ouest paléarctiques est rédigée.

## MOTS CLÉS

Paléarctique occidental,  
révision,  
nouvelle synonymie,  
combinaison nouvelle,  
espèce nouvelle.

## INTRODUCTION

*Xyalaspis* Hartig, 1843 is one of the nine genera of Figitidae Thomson, 1862 included in the subfamily Anacharitinae Thomson, 1862 (Mata-Casanova & Pujade-Villar 2013). This subfamily is easily distinguishable from the rest of the Figitidae by three synapomorphies (Ros-Farré *et al.* 2000): a rounded and continuous pronotal plate, broadly overlapping mandibles and a triangular-shaped head in front view, although in *Proanacharis* Kovalev, 1996 and some *Aegilips* Haliday, 1835 and *Xyalaspis* it is more quadrangular. The genus *Xyalaspis* is close to the genus *Aegilips*, both having a coriaceous malar sulcus and lacking an oblique groove in the mesopleuron. The character used to separate the two genera is the presence in *Xyalaspis* of a true scutellar spine derived from the circumscutellar carina (Restrepo-Ortiz & Pujade-Villar 2010).

*Xyalaspis* presents a subcosmopolitan distribution, being present on all continents except for Africa and Antarctica. The genus currently includes 17 species (Mata-Casanova *et al.*, 2014): ten Palaearctic, three Neotropical, one Nearctic, two species each in the Nearctic and Neotropical regions and one in the Australian region (Mata-Casanova *et al.* 2014a). Eight species have been cited from the Western Palaearctic: *Xyalaspis armata* (Giraud, 1860), *X. hyalina* Belizin, 1951, *X. laevigata* Hartig, 1843, *X. laevis* (Hedicke, 1914), *X. petiolata* Kieffer, 1901, *X. rugosa* Hartig, 1843, *X. spinigera* (Reinhard, 1860) and *X. subulifera* (Thomson, 1862).

The only revision of Palaearctic Anacharitinae including the genus *Xyalaspis* was undertaken by Dalla-Torre & Kieffer (1910). Belizin (1951) studied the Russian species, citing *X. armata* and describing a new species, *X. hyalina*. Ferguson (1986) reviewed the British species and described the biology of *X. petiolata* attacking the aphid-feeding larvae of *Hemerobius* sp. and *Wesmaelius subnebulosus* (Neuroptera: Hemerobiidae). Recently Ros-Farré & Pujade-Villar (2011) transferred *Omalaspis laevis* Hedicke, 1914 to the genus *Xyalaspis*. All the original descriptions are very short, the characters mentioned are not homogeneous and some important characters are not taken into account; for these reasons, a revision of the type material was needed for the precise differentiation of these species.

This study focuses on the Western Palaearctic *Xyalaspis* species and is part of a worldwide review of the genus *Xyalaspis*. The genus has already been revised for the American continent (Mata-Casanova *et al.* 2014a), and also species of the Eastern Palaearctic, Indomalayan and Australian areas have been revised (Mata-Casanova *et al.* 2014b). In this study *X. spinigera* is synonymized with *X. laevigata* and *X. subulifera* with *X. rugosa*. Moreover, *X. laevis* is transferred to genus *Aegilips*, and a new species, *X. pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp. is described. In order to summarize this information, an identification key for the Palaearctic *Xyalaspis* species is presented.

## ABBREVIATIONS

### Anatomy

F1-F12	First and subsequent flagellomeres;
LOL	Lateral-frontal ocellar distance (distance between the edges of the lateral and frontal ocelli);
OOL	Ocular-ocellar distance (shortest distance between the inner margin of the compound eye and the outer edge of the posterior ocellus);
POL	Post-ocellar distance (distance between the inner margins of the posterior ocelli);
T1-T7	Metasomal tergites 1 to 7.

### Depositories

CNC	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Canada;
MNHN	Muséum national d'Histoire naturelle, Paris, France;
NHM	The Natural History Museum, London, UK;
UB	Universitat de Barcelona, Barcelona, Spain;
ZIN	Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia;
ZSM	Zoologische Staatssammlung München, Munich, Germany.

## MATERIAL AND METHODS

The material identified in this study belongs to the CNC, the MNHN and the NHM; it has been deposited in the institutions mentioned above and in UB. The material provided by the MNHN was collected with Malaise traps in the Mercantour National Park in the Mediterranean Alps (France) during the

ATBI Mercantour project; detailed information on the sample code (given in brackets for each specimen), the corresponding trap geographic coordinates and the main vegetation present at sampling site is given in Deharveng *et al.* (2015, this volume). In total, 58 specimens were studied, comprising 48 males and 10 females. All *Xyalaspis* types have been examined, but in this study we only make reference to the type material of the Palearctic species of the genus: *X. armata*, *X. hyalinus*, *X. laevis*, *X. laevigata*, *X. petiolata*, *X. rugosa* and *X. spinigera*. Species are treated in alphabetical order.

Morphological terms used are from Richards (1977) and Ronquist (1995). All measurements are relative except for the body length. Antennal formula includes scape, pedicel and flagellomere length and relative width in brackets.

The specimens were studied at the “Serveis Científic-Tècnics de la Universitat de Barcelona” using stereomicroscopy and environmental scanning electron microscopy. A field-emission gun environmental scanning electron microscope (FEI Quanta 200 ESEM) was used for high-resolution imaging without gold-coating of the specimens in order to preserve the material.

## SYSTEMATICS

Family FIGITIDAE Thomson, 1862  
Subfamily ANACHARITINAE Thomson, 1862  
Genus *Xyalaspis* Hartig, 1843

*Xyalaspis armata* (Giraud, 1860)  
(Figs 1A; 2A; 4A)

*Aegilips armatus* Giraud, 1860: 173 (female).

*Xyalaspis armata* – Kieffer 1901: 161.

TYPE MATERIAL. — **Holotype**. ♀ with the following labels: “Holotype” (red label); “Muséum Paris, coll. Giraud 1877” (white label); “Holotype of *Aegilips armatus* Giraud, det. N. D. M. Ferguson, 1981” (white label); “*Xyalaspis armatus* (Giraud)♀, Kieffer, 1901, det. N. Mata-Casanova, 2012” (white label). (Deposited in MNHN).

BIOLOGY. — Unknown.

DISTRIBUTION. — Palearctic. Known from Sweden, Britain (Kieffer 1901); Germany, Austria (Dalla Torre & Kieffer 1910); Russia (Belizin 1951); Ireland (Ferguson 1986); Spain (Ros-Farré & Pujade-Villar 1997).

DIAGNOSIS. — Species with completely smooth mesoscutum similar to *X. atemiensis* Ashmead, 1904 and *X. pilosa* Mata-Casanova, 2013, from which it differs by the lack of internal carinae in the mesoscutum (notauli internally carinated in *X. atemiensis* and *X. pilosa*).

### REDESCRIPTION (FEMALE ONLY)

#### Length

Body 3.1 mm. Wings 3.1 mm. Antennae 2.8 mm.

#### Coloration

Head, mesosoma and metasoma black. Mandibles yellowish brown with darker teeth. Antennae yellowish-brown. Legs yellowish brown with darker coxae. Wing venation yellow.

#### Head

Width of head  $2 \times$  its height in front view and  $1.3 \times$  its length in dorsal view. Face smooth, shiny and pubescent, with abundant piliferous punctures. Malar sulcus present, coriaceous,  $0.7 \times$  height of compound eye. Transfacial line  $1.2 \times$  height of compound eye. Diameter of toruli larger than inter-toruli distance and that of torulus to compound eye. Clypeus short; smooth, glabrous and convex. Occipital and postocular carinae absent. Compound eyes almost glabrous except for a few short setae. POL:OOL:LOL ratio = 8:6:3, ocelli diameter 2. Frons smooth, shiny and shortly pubescent with some punctures.

#### Antennae

Flagellomeres cylindrical and hairy. Antennal formula: 12(5), 4.5(4), 11.5(3), 12(3), 10.5(3.5), 10(3.5), 9.5(4), 9(4), 8(4), 6(4), 6(4), 6(4), 12(4). Placodeal sensilla start at F2.

#### Mesosoma

Pronotum carinated in its lower part and smooth in the upper part (Fig. 2A). Mesoscutum  $1.2 \times$  wider than long in dorsal view. Mesoscutum smooth and shiny, almost glabrous except for few scarce setae and punctures. Notauli complete but weak, without internal transverse ridges (Fig. 1A); median mesoscutal furrow short and weakly impressed. Parapsidal signum and parascutal sulcus absent. Scutellum as long as mesoscutum in dorsal view. Scutellar foveae alutaceous, basally defined by a carina. Interfoveal line complete. Lateral pits of scutellar foveae weakly excavated. Scutellar spine with parallel sides and ending in a spike; nearly one-half of mesoscutellum length and slightly projecting upwards in lateral view. Mesopleuron smooth, shiny and glabrous, with weak basal transverse carinae. Mesopleural triangle smooth and pubescent. Propodeum heavily areolate; central area delimited by two longitudinal carinae and internally divided by some incomplete and weak internal carinae.

#### Wings

Pubescent. Radial cell of forewing closed,  $2.2 \times$  longer than wide. Marginal pubescence of forewing denser in apical third.

#### Metasoma

Petiole wider than long, carinated on all sides (Fig. 4A). Third abdominal tergum  $2.2 \times$  longer than fourth abdominal tergum in dorsal view. T5 and T6 visible in dorsal view. Anterior margin of T4-T7 punctuate.

*Xyalaspis hyalina* Belizin, 1951  
(Figs 1B; 2C)

*Xyalaspis hyalina* Belizin, 1951: 574 (male).

TYPE MATERIAL. — **Holotype**. ♂ with the following labels: “Kondara, 20.IX, Tadzhik SSR, 1945, V. Gussakovskij” (white label, handwritten, in Cyrillic); “Holotypus *Xyalaspis hyalinus* ♂, V. Belizin det” (red label, handwritten), “*Xyalaspis hyalinus*, V. Belizin, Kovalev det 1996” (white label). (Deposited in ZIN).

OTHER MATERIAL EXAMINED. — Cyprus: Pera Pedri Krios R, 10.IX.1937, G. A. Mavromoustakis, B. M. 1987-808, 1♂ (NHM).

BIOLOGY. — Unknown.

DISTRIBUTION. — Palaearctic. Known from Russia, Kazakhstan, Tajikistan (Belizin 1951), Armenia (Belizin 1961), first record from Cyprus.

DIAGNOSIS. — Species close to *X. laevigata*, but it can be distinguished by the presence of incomplete notauli, scutellar spine slightly projected upwards in lateral view and antennae longer than the body (notauli weakly impressed in *X. laevigata* but complete, scutellar spine straight in lateral view and antennae shorter than the body).

#### REDESCRIPTION (MALE ONLY)

##### Length

Body 2.8 mm. Wings 2.6 mm. Antennae 3.2 mm.

##### Coloration

Head, mesosoma and metasoma black. Mandibles yellowish-brown with darker teeth. Antennae yellowish-brown. Legs yellowish-brown with darker coxae. Wing venation yellow.

##### Head

Width of head 1.2 × its height in front view and 1.8 its length in dorsal view. Face smooth, shiny and pubescent, with abundant piliferous punctures. Malar sulcus present, coriaceous, 0.5 × height of compound eye. Transfacial line subequal to height of compound eye. Diameter of toruli equal to inter-toruli distance and larger than torulus to compound eye distance. Clypeus not apparent; smooth, glabrous and convex. Occipital and postocular carinae absents. Compound eyes completely glabrous. POL:OOL:LOL ratio = 6:4:2.5, ocelli diameter 2. Frons smooth, shiny and shortly pubescent with some punctae.

##### Antennae

Flagellomeres cylindrical and hairy. Antennal formula: 25(11), 9.5(9.5), 25(8), 25.5(8.5), 26(8.5), 24.5(8.5), 26(8), 26(8), 25(8), 25(7.5), 25(7), 23(7), 23(7), 28(6). Placodeal sensilla start at F1.

##### Mesosoma

Pronotum carinated in its lower part and smooth on its upper side (Fig. 2C). Mesoscutum 1.2 × wider than long in dorsal view. Mesoscutum smooth, pubescent and punctate, with alutaceous sculpture at base of notauli. Notauli weakly impressed and lacking internal carinae, being replaced by weak carinated sculpture at anterior third of the mesoscutum (Fig. 1B); median mesoscutal furrow weakly impressed. Parapsidal signum and parascutal sulcus absent. Scutellum 0.8 as long as mesoscutum in dorsal view. Scutellar foveae smooth, basally defined by a carina and including an oblique internal carina. Interfoveal line complete. Lateral pits of scutellar foveae distinct. Scutellar spine narrowing apically; slightly projected upwards in lateral view. Mesopleuron smooth, shiny and glabrous, basally carinated. Mesopleural triangle smooth and pubescent. Propodeum heavily areolate and pubescent; central area divided by a longitudinal median carina and a several transverse carinae defining eight cells.

##### Wings

Pubescent. Radial cell of the forewing closed, 2.4 × longer than wide. Marginal pubescence of forewing denser in its apical third.

##### Metasoma

Petiole as long as wide, dorsally smooth and laterally and ventrally carinated. T3 3.6 × longer than T4 in dorsal view. T5 and T6 are visible in dorsal view. Metasoma smooth and glabrous.

#### *Xyalaspis laevigata* Hartig, 1843

(Figs 1C; 2B; 3C, D)

*Xyalaspis laevigatus* Hartig, 1843: 417 (male).

*Aegilips spinigera* Reinhard, 1860: 221 (male).

*Xyalaspis laevigata* – Förster 1869: 361.

*Xyalaspis spinigera* – Kieffer 1901: 161.

TYPE MATERIAL. — **Holotype**. ♂ with the following labels: “*Xyalaspis laevigatus*” (white label, handwritten); “Weld, 1931” (red label, handwritten); “Holotype ♀ *Xyalaspis laevigatus* Hartig, 1843” (red label); “*Xyalaspis laevigata* Htg. C. Restrepo-Ortiz det. 2012” (white label). Deposited in ZSM.

**Lectotype**. ♂ with the following labels: “Type” (red label); “Coll. H.Rhd.” (white label); “Zool. Mus. Berlin” (white label) “Lectotypus *Aegilips spinigera* ♂ Reinhard, 1860, desig. N. Mata-Casanova, 2012” (red label); “*Xyalaspis spinigera* (Reinhard) ♂ Kieffer, 1901, det. N. Mata-Casanova, 2012” (white label). Deposited in Museum für Naturkunde.

OTHER MATERIAL EXAMINED. — **Spain**. 6 km Nerja (Costa del Sol), Málaga, 200 m, 6.VI.1988, coll. L. Masner, 1♂ (CNC). Montán, Castellón, 10.VIII.1988, coll. J. Selfa, 2♂ (UB). Lafortunada, Huesca, 4.VII.1995, coll. J. Pujade-Villar, 1♂ (UB).

**Andorra**. Santa Coloma, Malaise trap, IX.1992, coll. J. Pujade-Villar, 1♀ (UB).

**France**. Mt. Ventoux, Vaucluse, 1700 m, 27.VIII.1988, coll. Bouček, 1♀ (BMNH). Vallon de Sestrière, Saint-Dalmas-le-Selvage, Alpes-Maritimes, Malaise trap, 1421 m, 22.IX-7.X.2009 (M09-SES1400-T7-M2), 1♀ (MNHN); same locality, Malaise trap, 1437 m, 19.VIII-22.IX.2009 (M09-SES1400-T6-M1), 1♀ (MNHN); same locality, same trap, 22.IX-7.X.2009 (M09-SES1400-T6-M1), 1♂ (MNHN); same locality, Malaise trap, 1966 m, 23.VII-07.VIII.2009 (M09-SES2000-T4-M1), 1♀ (MNHN). Col de Salèse, Valdeblore, Alpes-Maritimes, Malaise trap, 2032 m, 24.VII-13.VIII.2009 (M09-BOR2000-M2-T4), 2♂ (MNHN); same locality, same trap, 27.VIII-18.IX.2009 (M09-BOR2000-M2-T6), 2♂ (MNHN).

**Germany**. Schneffau, Bayern, 800 m, 24.VII.1958, coll. D. Townes, 1♂ (CNC). Schliersee, Bayern, 1100 m, 28.VII.1958, coll. D. Townes, 1♂ (CNC).

**Norway**. Buolamalia, Detsika, Alta, 24.VI-16.VII.1996, coll. Lars Ove Hansen, 1♂ (CNC).

**Romania**. Kiruly Valley, Hargita, Co., 15.VIII.2000, coll. Zoltán Ács, 1♂ (CNC).

**Iran**. Gajert, Tehran, 23.VI.1978, coll. J. T. Huber, 1♂ (CNC).

BIOLOGY. — Unknown.

DISTRIBUTION. — Palaearctic. Known from Austria (Hartig 1843); first records for Spain, Andorra, France, Romania, Norway and Iran.



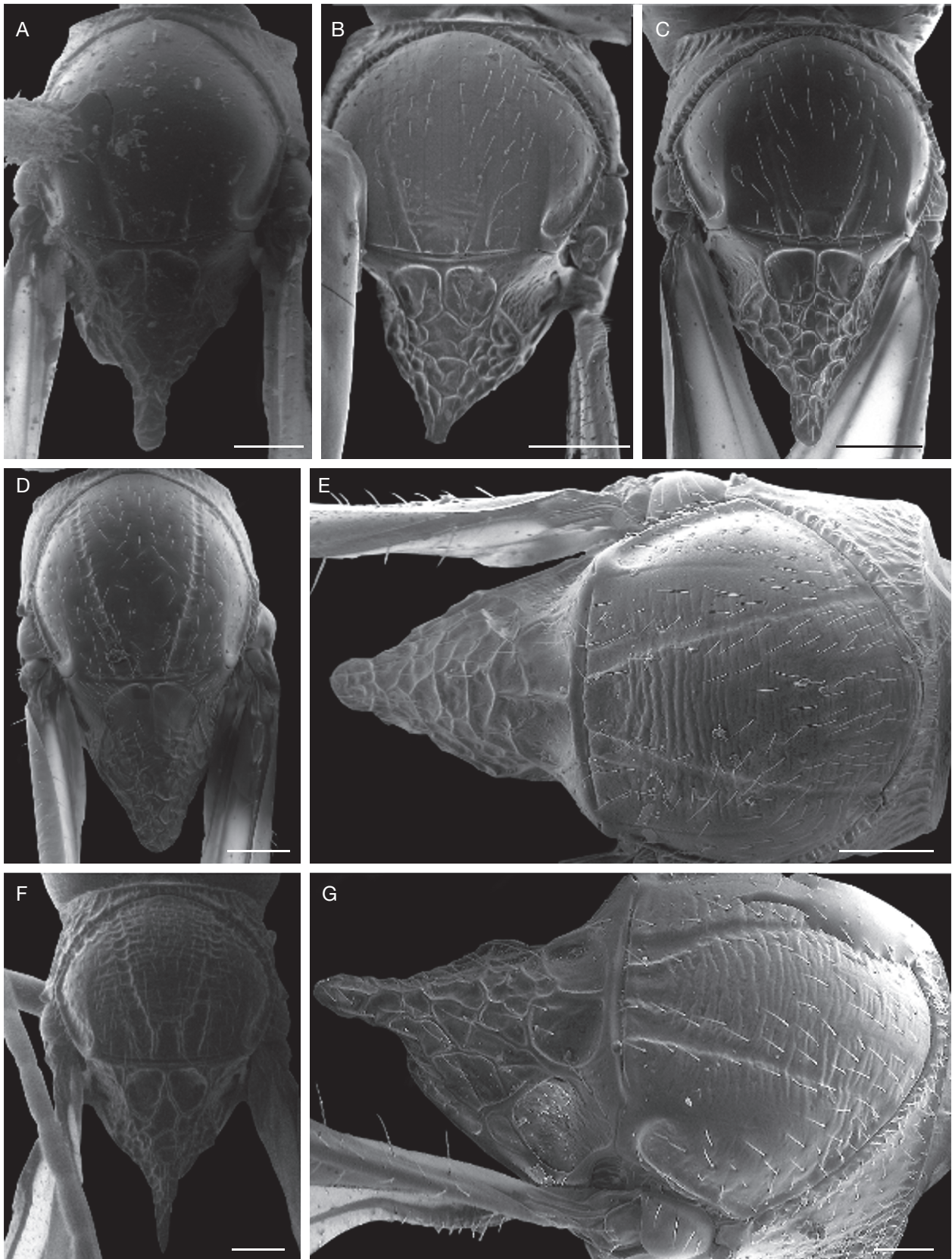


FIG. 1. — Mesoscutum in dorsal view of: **A**, *Xyalaspis armata* (Giraud, 1860); **B**, *Xyalaspis hyalina* Belizin, 1951; **C**, *Xyalaspis laevigata* Hartig, 1843; **D**, *Xyalaspis petiolata* Kieffer, 1901; **E**, **G**, *Xyalaspis pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp.; **F**, *Xyalaspis rugosa* Hartig, 1843. Scale bars: A-D, F, 200  $\mu$ m; E, G, 100  $\mu$ m.

**DIAGNOSIS.** — Species having a weak carinated sculpture at the base of notauli like *Xyalaspis hyalina*; it can be distinguished by the presence of complete notauli and having antennae shorter than the body (complete notauli and antennae longer than the body in *X. hyalina*).

#### REDESCRIPTION

##### Length

Body: 2.9 mm. Wings: 2.7 mm. Antennae: 2.8 mm (♂), 2.6 mm (♀).

##### Coloration

Head, mesosoma and metasoma black. Mandibles yellowish-brown with darker teeth. Antennae yellowish-brown. Legs yellowish-brown with darker coxae. Wing venation yellow.

##### Head

Width of head  $1.3 \times$  height in front view and 2 its length in dorsal view. Face smooth, shiny and pubescent, with abundant piliferous punctures. Malar sulcus present, coriaceous,  $0.6 \times$  height of compound eye. Transfacial line  $1.2 \times$  height of the compound eye. Diameter of toruli larger than inter-toruli distance and torulus to compound eye distance. Clypeus not apparent; smooth, glabrous and convex. Occipital and postocular carinae absents. Compound eyes almost glabrous except for several short setae concentrated in central eye. In females, POL:OOL:LOL ratio = 7:6:2.5, ocelli diameter 2; in males, POL:OOL:LOL ratio = 7:4:3, ocelli diameter 3.5. Frons smooth, shiny and shortly pubescent with some punctures.

##### Antennae

Flagellomeres cylindrical and hairy. Male antennal formula (type material only has from scape to F4, but other specimens with complete antennae have been used to complete the antennal formula): 10(3.5), 4(3.5), 10(3), 10(3), 10(3), 9(3), 9(3), 9(3), 8(3), 8(3), 7(3), 7(3), 6(3), 9(3). Female antennal formula: 11(3.5), 4(3), 10(2.5), 11(3), 9.5(3), 9.5(3), 8(3), 7.5(3), 7(3), 5(3), 5(3), 5(3), 9(3). Placodeal sensilla start at F2 in females and at F1 in males.

##### Mesosoma

Pronotum carinated in its lower part and on its margins but alutaceous in its upper part (Fig. 2B). Mesoscutum  $1.2$  wider than long in dorsal view. Mesoscutum smooth, pubescent and punctate, with alutaceous sculpture at base of notauli (Figs 1C; 3C), mesoscutum almost entirely carinated in some specimens (Fig. 3D). Notauli complete but weakly impressed, fading at anterior mesoscutum, not internally carinated; median mesoscutal furrow weakly impressed. Parapsidal signum and parascutal sulcus absent. Scutellum length subequal to mesoscutum length (22:23) in dorsal view. Scutellar foveae smooth, basally defined by a carina, an oblique internal carina present in some specimens. Interfoveal line complete. Lateral pits of scutellar foveae weakly impressed. Scutellum narrowing at base of scutellar spine; scutellar spine with parallel sides, projected from scutellum and straight in lateral view; between one-quarter to one-third of entire scutellum length. Mesopleuron smooth, shiny and glabrous, with basal trans-

verse carinae. Mesopleural triangle smooth and pubescent. Propodeum heavily areolate and pubescent; central area divided by a longitudinal median carina and a transverse carina which define two small, lower cells and two larger upper cells crossed by weaker transverse ridges.

##### Wings

Radial cell of forewing closed,  $2.7$  longer than wide. Marginal pubescence of forewing denser in its apical third.

##### Metasoma

Petiole longer than wide, ventrally and laterally carinated and dorsally smooth. T3  $2.5 \times$  longer than T4 in dorsal view. T5 and T6 visible in dorsal view. Anterior margin of T4-T7 punctate.

#### REMARKS

Although Hartig's (1843) original description mentions the holotype as being a female, it has 14 antennal segments and the metasomal shape of a male, so we concluded that Hartig was in error and the holotype of *X. laevigata* is a male.

#### *Xyalaspis petiolata* Kieffer, 1901 (Figs 1D; 2E; 3A, B; 4B)

*Xyalaspis petiolata* Kieffer, 1901: 161 (male).

**TYPE MATERIAL.** — **Lectotype.** ♂ with the following labels: "*Aegilips subulifera* JH" (white label, handwritten), "*Subulifera* JH" (white label, handwritten), "*Xyalaspis petiolata* Kieffer, det. R. B. Benson 1940" (white label), "Lectotype *Xyalaspis petiolata* det N. D. M. Ferguson, 1981" (white label), "*Xyalaspis petiolata* Kieffer, 1901, ♂, det. J. P-V 2012" (white label). (Deposited in NHM).

**OTHER MATERIAL EXAMINED.** — **UK.** Glenasmole, IX.1937, coll. A. W. Stelfox, 1♂ (NHM). Glenn Cova, 11-30.VI.1939, coll. I. E. & R. B. Benson, 1♂ (NHM). Waverley, 7.X.1952, H. W. Daltry, M. W. R de V, Graham, coll. 1♀ (NHM). New Forest, 5.IX.1958, H. W. Daltry, M. W. R de V, Graham coll. 1♂ (NHM). New Forest, 18.IX.1958, H. W. Daltry, M. W. R de V, Graham coll. 1♂ (NHM). SW Lough Rea, 30.V.1960, H. W. Daltry, M. W. R de V, Graham coll. 1♂ (NHM). Beinn Eighe Forest, 30.V.1961, coll. R. B. Benson, 1♂ (NHM). Kinlochewe, 1-8.VI.1961, coll. R. B. Benson, 1♂ (NHM). Shieldaig, 7.VI.1961, coll. R. B. Benson, 1♀ (NHM). Esher Common, Surrey, 30.V.70, coll. Bouček, 1♂ (NHM). Craswall, Hereford, 23-24.VI.73, 1♀ (NHM). Abbots Moss, 6.II.1974, M. R. Shaw, 1♂ (NHM). Abbots Moss, 3.X.1974, coll. M. R. Shaw, 1♂ (NHM). Burnham Beeches, Buckinghamshire, 3.VIII.75, Bouček, 1♀ (NHM). Northants, Spratton, In Malaise trap, VIII.1975, coll. I. & P. Gauld, 2♂ (NHM). Fife Tentsmuir Nat, 16.VII.1977, coll. Noyes, Rogers & Huddleston, 1♂ (NHM). Angus Airlie Castle, 19.VII.1977, coll. Noyes, Rogers & Huddleston, 2♂ (NHM). Barton Mills, Suffolk, 7.IX.1977, coll. J. S. Noyes, 1♀ (NHM). **Ireland.** Manor Kilbride, 19.VII.1950, coll. A. W. Stelfox, 1♂ (NHM). **France.** Col de Salèse, Valdeblore, Alpes-Maritimes, 2058 m, Malaise trap, 18.IX-05.X.2009 (M09-BOR2000-M1-T7), 1♀ (MNHN). **Sweden.** Höör distr., 16.VI.1938, coll. D. M. S. P. & J. F. P., B. M., 1♂ (NHM). Röstanga, 4.VII.1938, coll. D. M. S. P. & J. F. P., B. M., 1♂ (NHM). Fjellfota sjö, 7.VIII.1938, coll. D. M. S. P. & J. F. P., 2♂ (NHM).

**BIOLOGY.** — Known to attack *Hemerobius* sp. and *Wesmaleius subnebulosus* (Neuroptera: Hemerobiidae) (Ferguson 1986).



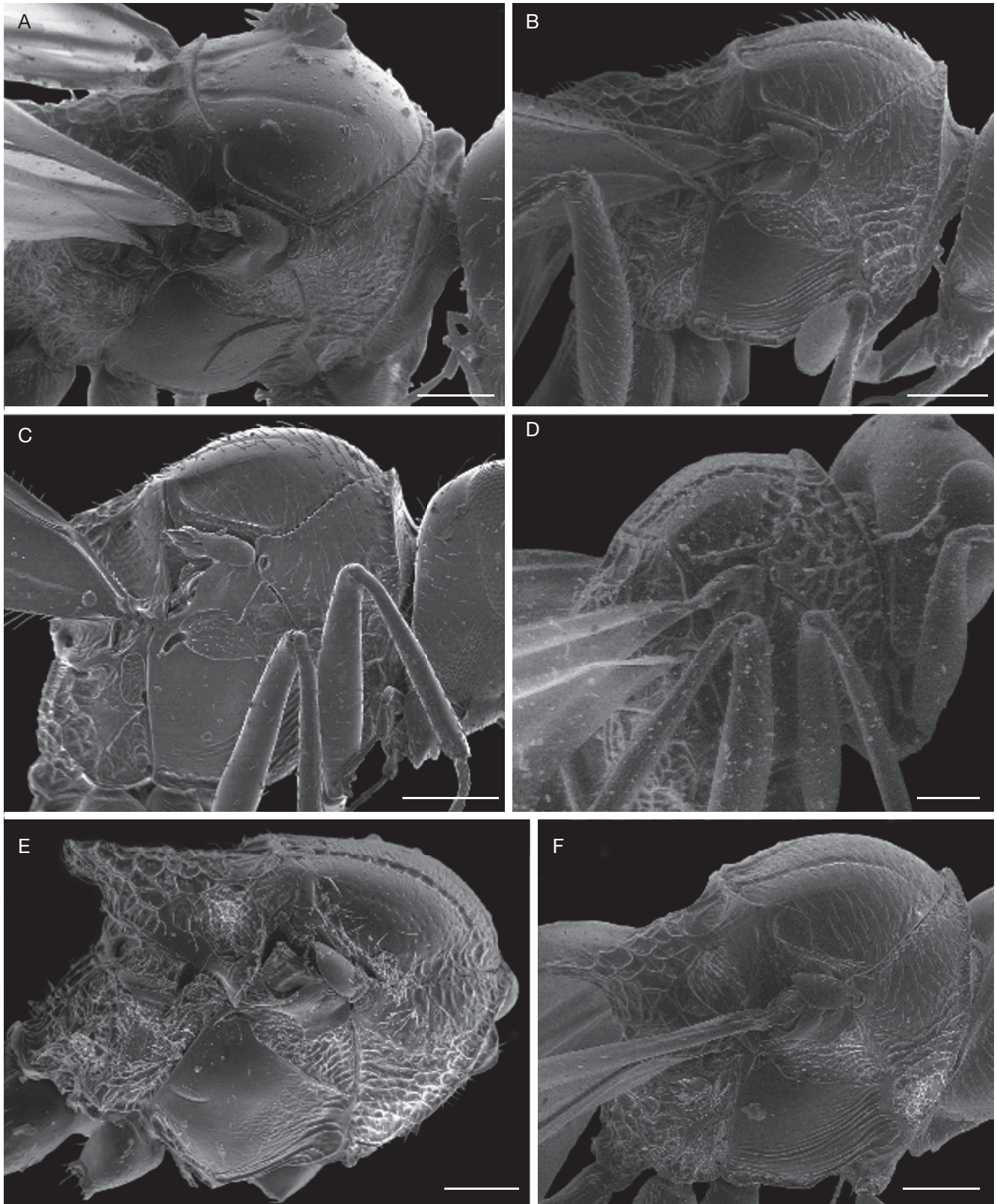


FIG. 2. — Mesosoma in lateral view of: **A**, *Xyalaspis armata* (Giraud, 1860); **B**, *Xyalaspis laevigata* Hartig, 1843; **C**, *Xyalaspis hyalina* Belizin, 1951; **D**, *Xyalaspis rugosa* Hartig, 1843; **E**, *Xyalaspis petiolata* Kieffer, 1901; **F**, *Xyalaspis pseudolaevigata* n. sp. Scale bars: 200 μm.

**DISTRIBUTION.** — Palaearctic. Known from Britain (Cameron 1883; Kieffer 1901) and Ireland (Ferguson 1986); first records from France and Sweden.

**DIAGNOSIS.** — Species belonging to the group of *Xyalaspis* having a weak carinated sculpture on the mesoscutum like *X. arapahoe* Mata-Casanova & Pujade-Villar, 2014, *X. flavipes* Ashmead, 1896 and *X. rugosus*, but clearly different from these species and all other *Xyalaspis* species in having scutellar spine rounded in dorsal view and an elongated mesoscutum (scutellar spine highly variable in length but always spike-ended and mesoscutum wider than long other *Xyalaspis* species).

#### REDESCRIPTION

##### Length

Body 3.3 mm. Wings 2.9 mm. Antennae 2.9 mm (♂), 2.6 mm (♀).

##### Coloration

Head, mesosoma and metasoma black. Mandibles yellowish-brown with darker teeth. Antennae dark yellowish-brown. Legs yellowish-brown with darker coxae. Wing venation dark brown.

##### Head

Width of head  $1.2 \times$  its height in front view and 2 its length in dorsal view. Face smooth, shiny and pubescent, with abundant piliferous punctae. Malar sulcus present, coriaceous,  $0.7 \times$  height of compound eye. Transfacial line  $1.2 \times$  height of compound eye. Diameter of toruli larger than inter-toruli distance and torulus to compound eye distance. Clypeus short; smooth, glabrous and convex. Occipital and postocular carinae absent. Compound eyes almost glabrous except for a few short setae. In females, POL:OOL:LOL ratio = 7:5:3, ocelli diameter 3; in males, POL:OOL:LOL ratio = 7.5:5:3, ocelli diameter 3.5. Frons smooth, shiny and shortly pubescent with some punctae.

##### Antennae

Flagellomeres cylindrical and hairy. Male antennal formula (type material only has F1 to F10, but other specimens with complete antennae have been used to complete the antennal formula): 9(3.5), 4(3.5), 10(3.5), 11(3.5), 11(3.5), 10(3.5), 10(3), 10(3), 9(3), 8(3), 8(3), 7.5(2.5), 7(2.5), 9(2.5). Female antennal formula: 11(4.5), 4(3.5), 12(2.5), 10.5(3), 9.5(3), 8.5(3), 8(3), 7(3), 7(3.5), 6.5(3.5), 6(3.5), 5.5(3.5), 9.5(3.5). Placodeal sensilla in start at F3 females and at F1 in males; they are abundant in males but scarce in females.

##### Mesosoma

Pronotum alutaceous and laterally carinated (Fig. 2E). Mesoscutum  $0.9$  wider than long in dorsal view (Figs 1D; 3A, B). Mesoscutum sculpture highly variable between notauli: from smooth with slightly coriaceous and carinated sculpture at base of notauli (Fig. 3A) to completely alutaceous and carinated except for central mesoscutum (Fig. 3B). Notauli complete with transverse carinated sculpture; median mesoscutal furrow apparent. Region between external edge of notauli and margins of mesoscutum smooth and punctate. Parapsidal signum and

parascutal sulcus present but weak. Scutellum  $0.8 \times$  mesoscutum length in dorsal view. Scutellum coriaceous and heavily areolate. Scutellar foveae alutaceous, weakly defined by a basal carina. Interfoveal line complete. Lateral pits of scutellar foveae absent. Scutellar spine one-quarter of entire length of scutellum; rounded in dorsal view (Figs 1D; 3A, B) and straight in lateral view. Mesopleuron smooth, glabrous and shiny, lower transverse carinae becoming alutaceous as they reach the posterior mesopleuron; mesopleural triangle smooth with vertical carinae. Propodeum coriaceous, heavily areolate and pubescent; central area divided by a central longitudinal carina and several transverse carinae which define eight coriaceous cells.

##### Wings

Radial cell of forewing closed,  $2.2$  longer than wide. Marginal pubescence of forewing denser in apical third.

##### Metasoma

Petiole longer than wide, carinated on all sides (Fig. 4B). Third abdominal tergum  $2.2 \times$  longer than the fourth abdominal tergum in dorsal view. T5 and T6 in dorsal view. Metasoma smooth and glabrous; anterior margin of T4-T7 punctate.

#### REMARKS

Cameron (1883) misidentified the collected British material and placed it under the designation *Aegilips subulifera*. Kieffer found that those specimens belong to a different species and described them as *Xyalaspis petiolata* (Ferguson 1986). Regarding their morphological variability, most of the studied specimens present an alutaceous strip in the back of the internal edge of the compound eye, but this strip is variable in extension and can be absent in some specimens, hence it has been discarded for the recognition of the species.

#### *Xyalaspis pseudolaevigata*

Mata-Casanova & Pujade-Villar, n. sp.  
(Figs 1E, G; 2F)

**TYPE MATERIAL.** — **Holotype.** ♂ with the following labels: “Le Boréon (France, Valdeblore), 1549 m, Malaise trap, 24.VII-13.VIII.2009: 1♂” (white label), “*Xyalaspis pseudolaevigata* Mata-Casanova & Pujade-Villar n. sp., design Mata-Casanova-2013” (red label). Deposited in MNHN. Sample code (M09-BOR1400-M2-T4). **Paratypes.** (14♂): Htes. Alp. Brunissard, 19.7.90, coll. Bouček, 1♂ (BMNH). Vallon de Sestrière, Saint-Dalmas-le-Selvage, 1966 m, Malaise trap, 23.VII-07.VIII.2009 (M09-SES2000-M1-T4), 3♂ (MNHN); same locality, same trap, 07-19.VIII.2009 (M09-SES2000-M1-T4), 2♂ (MNHN). Col de Salèse, Valdeblore, Malaise trap, 2032 m, 24.VII-13.VIII.2009 (M09-BOR2000-M2-T4), 1♂ (MNHN); same locality, same trap, 13-27.VIII.2009 (M09-BOR2000-M2-T5), 4♂ (MNHN); same locality, Malaise trap, 2058 m, 13-27.VIII.2009 (M09-BOR2000-M1-T5), 2♂ (MNHN). Le Boréon, Valdeblore, 1540 m, Malaise trap, 13-27.VIII.2009 (M09-BOR1400-M1-T5), 1♂ (MNHN).

**ETYMOLOGY.** — The specific epithet makes reference to the close resemblance to *X. laevigata*.

**BIOLOGY.** — Unknown.

**DISTRIBUTION.** — Palaearctic. Only recorded from France.



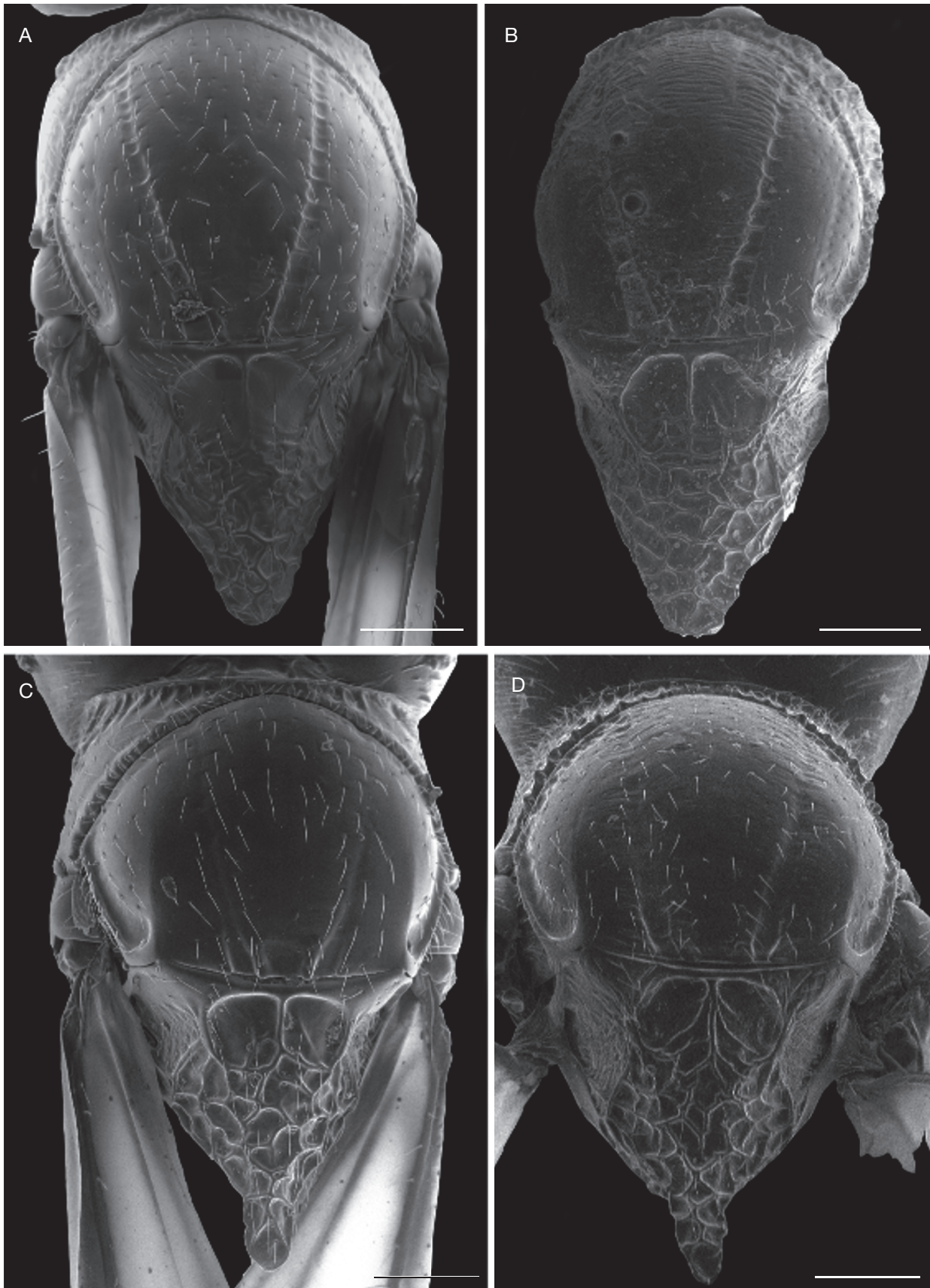


FIG. 3. — Mesoscutum sculpture variability in: **A, B**, *Xyalaspis petiolata* Kieffer, 1901; **C, D** *Xyalaspis laevigata* Hartig, 1843. Scale bars: 200 µm.

**DIAGNOSIS.** — Species morphologically close to *X. laevigata*, but differs in having mesoscutum heavily carinated along its entire length and internally carinated notauli (only slightly carinated, notauli nearly disappearing in the anterior region of the mesoscutum and not internally carinated in *X. laevigata*), and darker coloration with brownish to black legs and antennae and smoked wing (legs and antennae yellowish and wings hyaline in *X. laevigata*).

#### DESCRIPTION

##### Length

Body 2.5 mm. Wings 2.6 mm. Antenna 2.8 mm (♂).

##### Coloration

Head, mesosoma and metasoma black. Mandibles yellowish-brown with darker teeth. Antennae dark brown to black. Legs black, except yellowish at joint between femur and tibia. Wing venation dark brown, wing membrane smoked.

##### Head

Width of head  $1.3 \times$  its height in front view and  $2.1 \times$  its length in dorsal view. Face smooth, shiny and pubescent, with abundant piliferous punctae. Malar sulcus present, coriaceous,  $0.6 \times$  height of compound eye. Transfacial line  $1.1 \times$  height of compound eye. Diameter of toruli equal to inter-toruli distance and larger than torulus to compound eye distance. Clypeus short; smooth, glabrous and convex. Occipital and postocular carinae absent. Compound eyes almost glabrous except for a few short setae. In females, POL:OOL:LOL ratio =  $5.5:4:2$ , ocelli diameter 2. Frons smooth, shiny and shortly pubescent with some punctae.

##### Antennae

Flagellomeres cylindrical and hairy. Male antennal formula: 8.5(4), 3.5(3.5), 9(3), 10(3), 9(3), 9(3), 8(3), 9(3), 8.5(3), 8(3), 7.5(3), 7.5(2.5), 7(2.5), 9.5(2.5). Placodeal sensilla start at F1 in males and abundant in all flagellomeres.

##### Mesosoma

Pronotal plate alutaceous. Pronotum alutaceous and carinated in lateral view, with weaker sculpture in its upper part (Fig. 2F). Mesoscutum  $1.3 \times$  wider than long in dorsal view. Mesoscutum alutaceous, transversely carinated along its entire length (Fig. 1E, G); notauli complete and internally carinated, median mesoscutal furrow short. Parapsidal suture present but not clearly distinguishable; parascutal sulcus weakly impressed. Scutellum coriaceous and heavily carinated. Scutellum length equal to mesoscutum length in dorsal view. Scutellar foveae large and smooth, basally defined by a carina. Interfoveal line complete. Lateral pits of scutellar foveae large but weakly impressed, not distinct. Scutellum narrowing towards base of scutellar spine; scutellar spine parallel sided, projecting downwards in males in lateral view, length of spine about one-third of the scutellum entire length. Mesopleuron carinated, glabrous and shiny, smooth only in its upper third. Mesopleural triangle coriaceous and glabrous, with oblique carinae. Propodeum coriaceous, divided into quadrangular cells delimited by carinae in its central region; cells becoming smaller in the lower propodeum.

##### Wings

Pubescent. Radial cell of forewing closed, 2.6 longer than wide. Marginal pubescence of forewing denser in apical third.

##### Metasoma

Petiole coriaceous and longer than wide. Third abdominal tergum  $2.8 \times$  longer than fourth abdominal tergum in dorsal view. T5-T7 abdominal terga are visible in dorsal view. Metasoma glabrous; anterior margin of T4-T7 punctate.

#### *Xyalaspis rugosa* Hartig, 1843 (Figs 1F; 2D)

*Xyalaspis rugosus* Hartig, 1843: 417 (female).

*Aegilips subulifera* Thomson, 1862: 412 (male) n. syn.

*Xyalaspis subulifera* – Kieffer 1901: 161.

**TYPE MATERIAL.** — **Holotype.** ♀ with the following labels: “*Xyalaspis rugosus*” (white label, handwritten); “Holotype, *Xyalaspis rugosus* ♀, Hartig, 1843, det. J. P-V 2009” (red label). (Deposited in ZSM).

**Lectotype.** ♂ with the following labels: “*Subulifera*” (white label, handwritten); “Typ” (red label); “Lectotypus *Aegilips subulifera* ♂ Thomson, 1862, desig. N. Mata-Casanova, 2012” (red label); “*Xyalaspis subulifera* (Thomson) ♂ Kieffer, 1901, det. N. Mata-Casanova, 2012” (white label). (Deposited in Lund University).

**OTHER MATERIAL EXAMINED.** — **France.** Vallon de Saint-Dalmas, Saint-Dalmas-le-Selvage, Alpes-Maritimes, Malaise trap, 1421 m, 10-23.VII.2009 (M09-SES1400-M2-T3), 1 ♂ (MNHN).

**Switzerland.** Santa Maria, Müstairtal, 1400 m, 27.VI.1960, coll. J. E. & R. B. Benson, 1 ♂ (NHM).

**BIOLOGY.** — Unknown.

**DISTRIBUTION.** — Palaearctic. Known from Sweden (Thomson 1862); Austria (Kieffer 1898); Norway (Hedicke 1930), Netherlands (Evenhuis 1965); first records for France and Switzerland.

**DIAGNOSIS.** — Species belonging to the group of *Xyalaspis* having a transversely carinated mesoscutum (*X. aberrans* Mata-Casanova & Pujade-Villar, 2014, *X. alveolata* Mata-Casanova & Pujade-Villar, 2014, *X. arapahoe*, *X. flavipes*, *X. hirsuta* Mata-Casanova & Pujade-Villar, 2014, and *X. victoriensis* New, 1979 (*X. victoriensis*); it can be distinguished from all these species except *X. arapahoe* by the presence of a long scutellar spine. It differs from *X. arapahoe* in presentin a median mesoscutal furrow, lateral pits and basal carina of scutellar foveae (all absent in *X. arapahoe*).

#### REDESCRIPTION

##### Length

Body 2.7 mm. Wings 2.8 mm. Antennae 1.95 mm (♀, F6 to F11 absent), 2.8 mm (♂).

##### Coloration

Head, mesosoma and metasoma black. Mandibles yellowish brown with darker teeth. Antennae yellowish-brown. Legs yellowish-brown with darker coxae. Wing venation yellow.

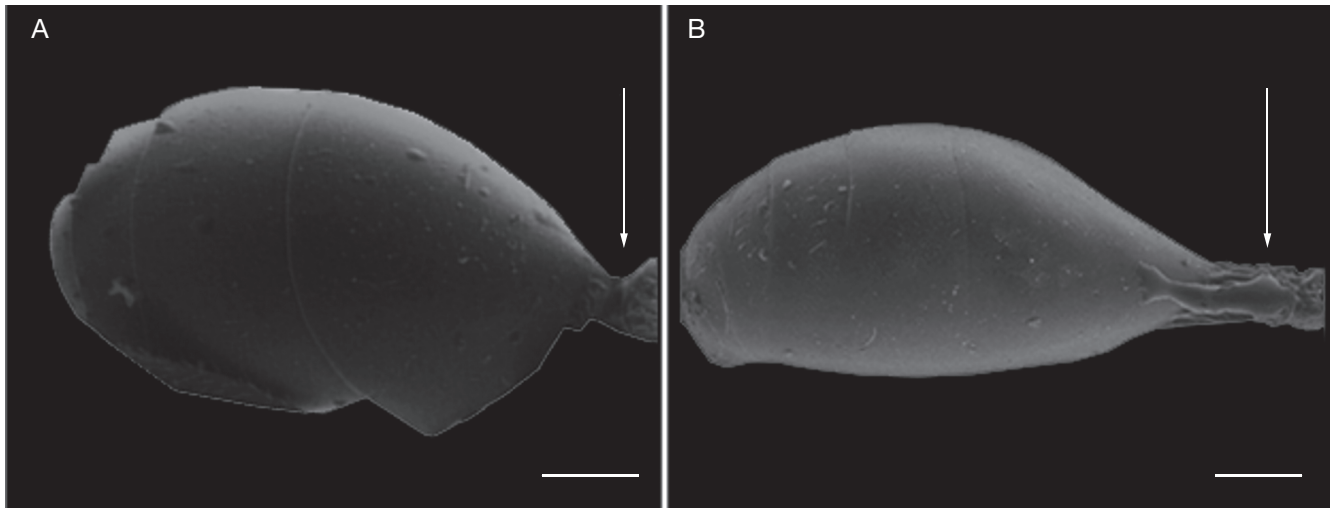


FIG. 4. — Metasoma of: **A**, *Xyalaspis armata* (Giraud, 1860); **B**, *Xyalaspis petiolata* Kieffer, 1901; arrows marking the petiole. Scale bars: 200  $\mu$ m.

### Head

Width of head  $1.3 \times$  its height in front view and  $2.5 \times$  its length in dorsal view. Face smooth, shiny and pubescent, with abundant piliferous punctures. Malar sulcus present, coriaceous,  $0.8 \times$  height of compound eye. Transfacial line  $1.2 \times$  height of compound eye. Diameter of toruli larger than inter-toruli distance and torulus to compound eye distance. Clypeus short; smooth, glabrous and convex. Occipital and postocular carinae absent. Compound eyes almost glabrous except for few short setae. In females, POL:OOL:LOL ratio =  $7.5:5:3$ , ocelli diameter 2; in males, POL:OOL:LOL ratio =  $7.5:6.5:3$ , ocelli diameter 3. Frons smooth, shiny and shortly pubescent with some punctae.

### Antennae

Flagellomeres cylindrical and hairy. Female antennal formula (flagellomeres absent from F6 onwards): 11.5(4.5), 4.5(3.5), 11(2.5), 13(3), 11(3), 12(3), 10(3), 9(3). Male antennal formula: 9(3.5), 4(3.5), 10(3.5), 11(3.5), 11(3.5), 10(3.5), 10(3), 10(3), 9(3), 8(3), 8(3), 7.5(2.5), 7(2.5), 9(2.5). Placodeal sensilla start at F3 in females and at F1 in males.

### Mesosoma

Pronotum alutaceous, heavily sculptured with irregular ridges (Fig. 2D). Mesoscutum  $1.3$  wider than long in dorsal view. Mesoscutum transversely carinated over its entire length, carinae weaker in the central region (Fig. 1F). Notauli complete with transverse carinated sculpture; median mesoscutal furrow short and weakly impressed. Lateral region of mesoscutum smooth and punctate, parapsidal signum and parascutal sulcus present and distinct. Scutellum as long as mesoscutum in dorsal view. Scutellum coriaceous and heavily areolate. Scutellar foveae large and smooth, basally defined by a carina. Interfoveal line complete. Lateral pits of the scutellar foveae large and distinct. Scutellum narrowing towards base of scutellar spine; scutellar spine parallel sided and clearly projecting from scutellum (Fig. 1F), nearly half as long as scutellum;

straight in lateral view. Mesopleuron smooth, glabrous and shiny in its upper half and heavily carinated in its lower half; mesopleural triangle large, alutaceous and glabrous. Propodeum alutaceous, central area delimited by two slightly curved carinae and divided by an irregular longitudinal carinae and several transverse carinae.

### Wings

Radial cell of forewing closed,  $2.4$  longer than wide. Marginal pubescence of forewing denser in apical third.

### Metasoma

Petiole longer than wide, carinated and alutaceous on all sides. Third abdominal tergum  $3.7 \times$  longer than fourth abdominal tergum in dorsal view. T5 and T6 abdominal terga visible in dorsal view. Metasoma smooth and glabrous; anterior margin of T4-T7 punctate.

### REMARKS

After examining the type material of both species and undetermined material, we conclude that *X. subulifera* is a junior synonymy of *X. rugosa*. Both present same carinated sculpture of the mesoscutum and a long, clearly projected scutellar spine.

### DISCUSSION

Hedicke (1914) described *Omalaspis laevis* from Féchain, France. This species was transferred to the genus *Xyalaspis* by Ros-Farré & Pujade-Villar (2011). After examining the type material (1 $\sigma$  deposited in MNHN) we concluded that this species belongs to *Aegilips*. It therefore becomes *Aegilips laevis* (Hedicke, 1914) n. comb., leaving six species of *Xyalaspis* in the Western Palearctic: *X. armata*, *X. hyalina*, *X. laevigata*, *X. petiolata*, *X. pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp. and *X. rugosa*.



# KEY TO THE WESTERN PALAEARCTIC SPECIES OF *XYALASPIS* HARTIG, 1843

1. Mesoscutum longer than wide, scutellar spine rounded in dorsal view, never projected (Figs 1D; 3A, B)..... *X. petiolata* Kieffer, 1901  
— Mesoscutum wider than long, scutellar spine never rounded in dorsal view..... 2
2. Mesoscutum smooth or only weakly carinated (Fig. 1A-C) ..... 3  
— Mesoscutum transversely carinated over its entire length (Fig. 1E-G) ..... 5
3. Mesoscutum completely smooth (Fig. 1A), petiole wider than long (Fig. 4A).....*X. armata* (Giraud, 1860)  
— Mesoscutum always presenting weak transverse carinae at base of notauli (Fig. 1B, C), petiole as long as wide or longer than wide ..... 4
4. Notauli disappeared in anterior part of mesoscutum, transverse carinae reduced to base and edges of the notauli (Fig. 1B), antennae longer than body ..... *X. hyalina* Belizin, 1951  
— Notauli fading in anterior part of mesoscutum but not entirely disappearing (Figs 1C; 3C, D), transverse carinae highly variable in extension from the base of notauli (Figs 1C; 3C) to the entire surface of mesoscutum (Fig. 3D), antennae shorter than body .....*X. laevigata* Hartig, 1843
5. Scutellar spine clearly distinguishable from mesoscutellum (Fig. 1F), legs and antennae yellowish, wings hyaline ..... *X. rugosa* Hartig, 1843  
— Scutellar spine not clearly distinguishable from mesoscutellum (Fig. 1E, G), legs and antennae black, wings smoked .....*X. pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp.

The mesoscutum sculpture of the *Xyalaspis* species included in this study is not as highly variable as in the Neotropical species, although they still present variability and this feature has a key role in differentiating the species. The mesoscutum of *X. armata* is smooth, with no internal sculpture in the notauli (Fig. 1A). *X. hyalina* and *X. laevigata* have an overall smooth mesoscutum, although it is slightly carinated at the base of the notauli in *X. hyalina* (Fig. 1B) and has a more extended carinated sculpture in *X. laevigata* (Figs 1C; 3C, D). Both species present weakly impressed notauli that vanish in the anterior third in *X. hyalina*. *X. petiolata* presents high variability in the mesoscutal sculpture, from some weak carinae reduced at the base of the notauli (Fig. 3A) to a completely carinate mesoscutum (Fig. 3B), although the carinated sculpture of the central region is weaker. Finally, *X. rugosa* (Fig. 1F) and *X. pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp. (Fig. 1E, G) present transversely carinated sculpturing on the entire mesoscutum surface.

The scutellar spine is also highly variable between species. In *X. petiolata* it is rounded and not spiked while in the rest of the studied species it projects and forms a spike (Figs 1D; 3A, B). In *X. hyalina* the scutellar spine is not clearly distinguished from the mesoscutellum (Fig. 1B); in *X. armata* (Fig. 1A), *X. laevigata* (Fig. 1C) and *X. pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp. (Fig. 1E, G) the mesoscutellum narrows toward the base of the scutellar spine; in *X. rugosa* the scutellar spine has parallel edges and is clearly distinguishable from the mesoscutellum (Fig. 1F). As mentioned earlier, the presence of a true scutellar spine allows to separation of *Xyalaspis* from *Aegilips*. However, it is interesting to note that some individuals of *X. laevigata* and *X. petiolata* present remains of the circumscutellar carina.

With regard to the distribution of the species examined in this study, the data obtained indicate that *Xyalaspis hyalina*

has a range from Cyprus to Tadjikistan, being the easternmost of the *Xyalaspis* species present in the Western Palaearctic region. *X. laevigata*, previously cited only from Austria, is here recorded for the first time from Spain, Andorra, France, Germany, Norway, Romania and Iran, extending its distribution across the European continent and reaching the Middle East. The distribution of *X. petiolata*, previously known only from the British Isles, is expanded to include France and Sweden. The distribution of *X. rugosa*, previously known from Austria, is expanded to Britain, Norway, Sweden, the Netherlands and, after being synonymized with *X. subulifera*, it is cited for the first time from France and Switzerland, making it the most widespread species of *Xyalaspis* on the European continent. Although there are no new records for *X. armata*, this species is widely distributed across Europe, being cited in the British Isles, Sweden, Germany, Austria and Russia. *Xyalaspis pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp. is only known from France; all but one of the available records come from the Mercantour National Park. It is noteworthy that for all species collected in the Mercantour National Park most of the specimens collected were males; the sole specimen of *X. petiolata* obtained was also the only female represented in the collections studied here. The female of *X. pseudolaevigata* Mata-Casanova & Pujade-Villar, n. sp. remains unknown.

The biology of *Xyalaspis* is still poorly understood in regions where this genus occurs. Although it is known that *Xyalaspis petiolata* attacks the aphid-feeding larvae of *Wesmaelius subnebulosus* and *Hemerobius* sp. (Neuroptera: Hemerobiidae), the hosts of the other five species remain unknown. Palaearctic *Xyalaspis* species have a wide range of suitable hosts, with 170 species of Hemerobiidae reported, most of them from the Western Palaearctic (Makarkin, 1995). More research must be undertaken to fully understand the biology of *Xyalaspis*.



## Acknowledgements

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